Ring Gear and Pinion Adjustment

Ring gear and pinion are both adjustable to provide the proper tooth contact. Differential bearings are provided with adjusting nuts by which the differential and ring gear may be moved transversely in relation to the pinion.

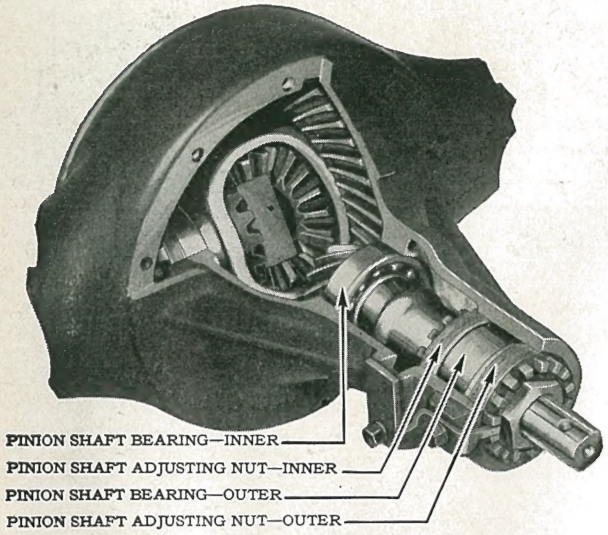

Fig. 56. Pinion Adjustment

The pinion and pinion shaft, together with the single and double row ball bearings, as a unit may be adjusted. This adjustment may be made fore and aft by two adjusting nuts which are located, one ahead and one behind the double row bearing. The rear nut is adjusted through a hole under a cover plate in the right side of the differential carrier and the front one is exposed at the forward end of carrier. When pinion has been located in proper position both nuts should be set tight against the double row bearing and locked in place.

This adjustment is made with the propeller shaft in place. See Fig. 56.

Front Axle

Front axle is a reverse Elliott type drop forged of high carbon steel and heat treated. The portion of the axle between the spring pads has an I section. The ends outside of the spring pads have an oval section to resist the torsional strains due to the front wheel brakes.

The ends of the axle are machined to receive the king pins, which are inclined outward at the bottom at an angle of 9½°. The center line of the king pin extended will strike the ground very close to the center of the wheel track.

Steering knuckles are machined with an angle of 101¼°, measured between the king pin center line and the spindle center line. The combination of these two angles produces a downward inclination of the spindle and gives the wheels a camber of 1¾°. These angles are fixed and do not change unless the axle is bent. This construction provides ease of steering because of the reduction of side pressures on the king pin bearings in the knuckles and the reduction of the arc through which the point of the tire in contact with the road travels when the wheels are given the proper toe-in, because the inclined wheel tends to roll in a circle whose center lies in the direction of the inclination of the wheel at the top.

The axle is mounted to springs such in manner that the king pins tilt backward at the top. This angularity is called castor. Due to the castor angle, the center line of the king pin extended will strike the ground at a point slightly in advance of the point of the tire contact. This results in a trailing effect on the wheels. Insufficient castor angle causes the car to wander. Too much castor may produce, at certain speeds, a condition in which the wheels wabble or

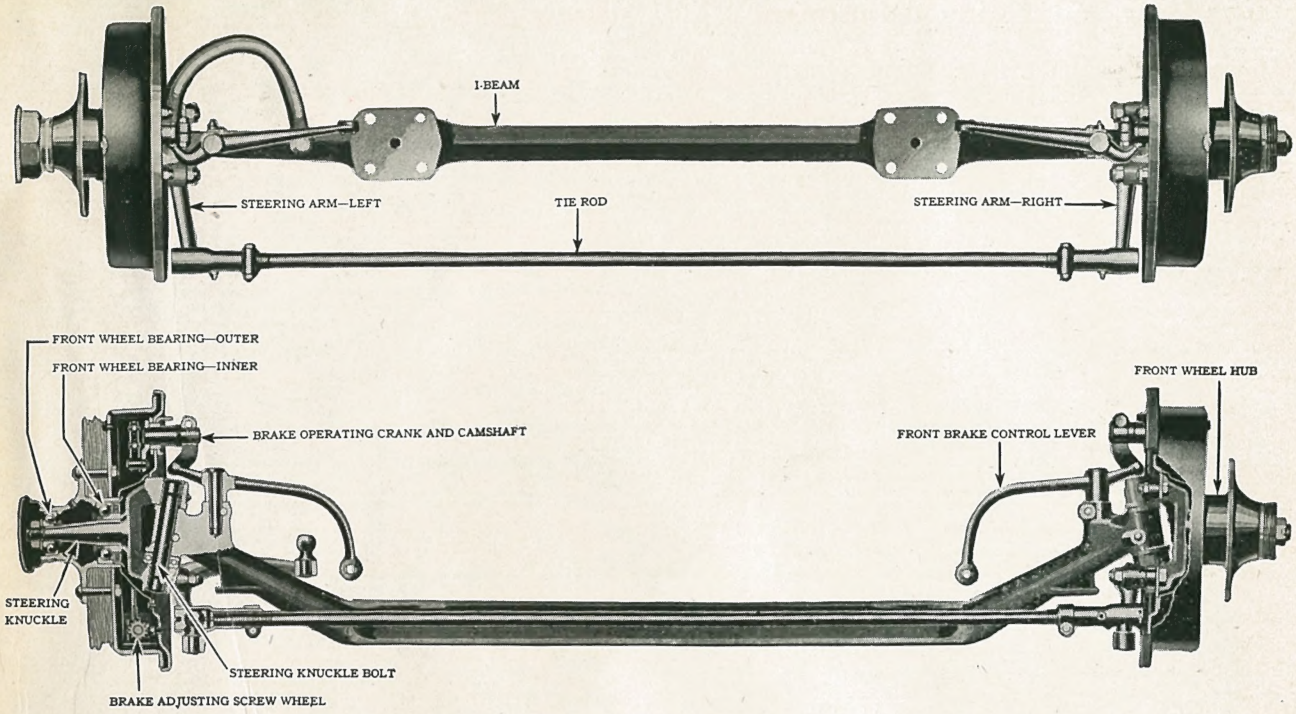

Fig. 57. Front Axle

shimmy. If the castor angle has changed due to sagging of the springs it should be corrected by the use of wedges between the springs and the I-beam.

Steering knuckles are drop forged of nickel alloy steel and heat treated. Each knuckle carries two bronze bushings for the king pins.

King pins are made of high carbon steel, heat treated, hardened and ground. Pins are locked in the axle ends.

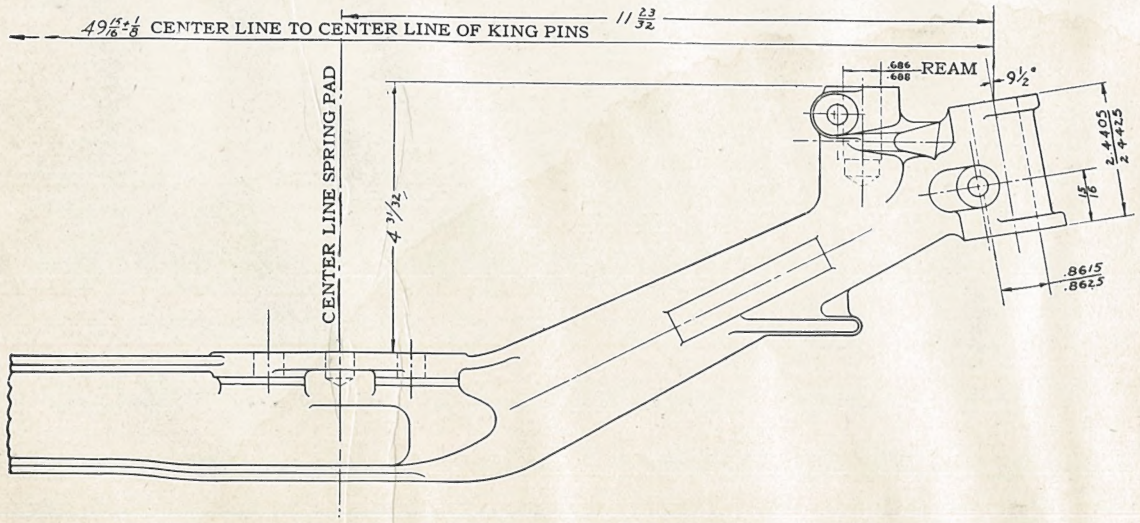

Fig. 58. Front Axle—Dimensions

Axle Details

I-beam section . . . . . 2 1/8" x 7/32" x 1 3/4" wide

Knuckles

Spindle dia.—Inner . . . . . 1 5/16"

Spindle dia.—Outer . . . . . 3/4"

King pin—Dia . . . . . 7/8"

King pin—Bushings . . . . Two—Bronze 1 1/4" long

King pin—Thrust bearing . . . . . Seventeen—1/4" balls

Tie rod—Outside dia . . . . . 3/4"

Axle tread . . . . . 56 17/32"

Clearance under I-beam . . . . . 8 1/8"

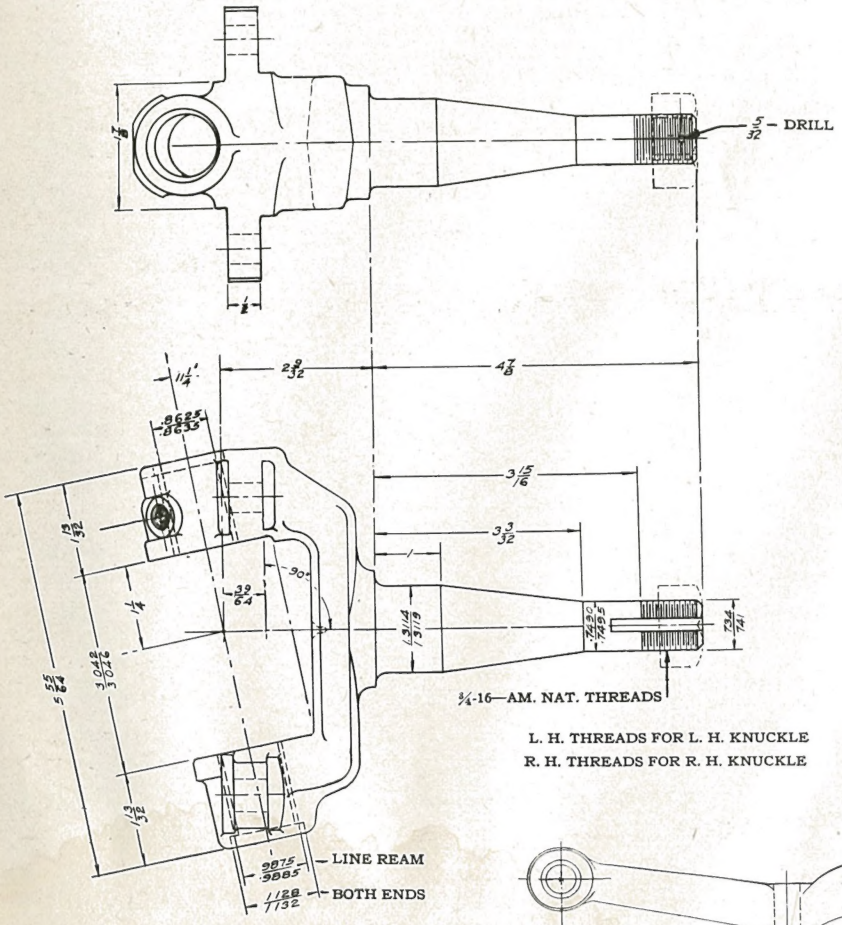

Fig. 59. Steering Knuckle—Dimensions

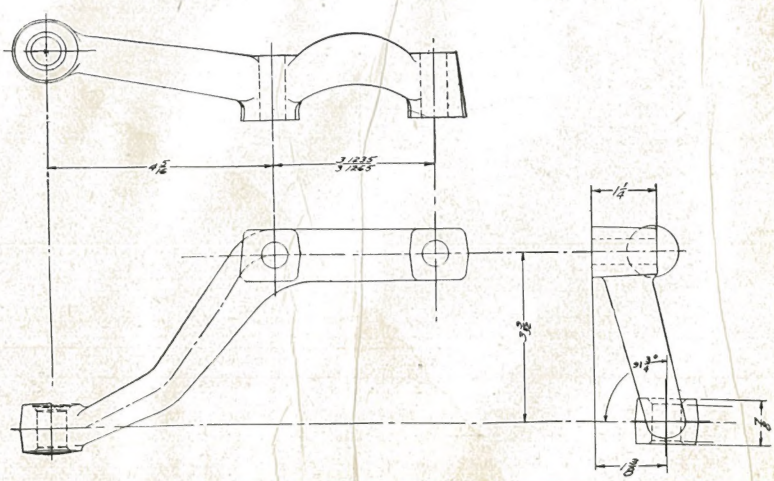

Fig. 60. Steering Arm, Right—Dimensions

Tie Rod

Tie rod is made of ¾" rod threaded on either end to adjustable ball socket nuts.

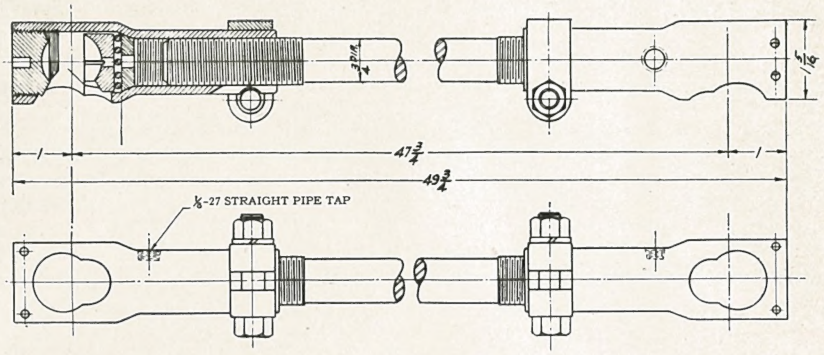

Fig. 61. Tie Rod—Dimensions

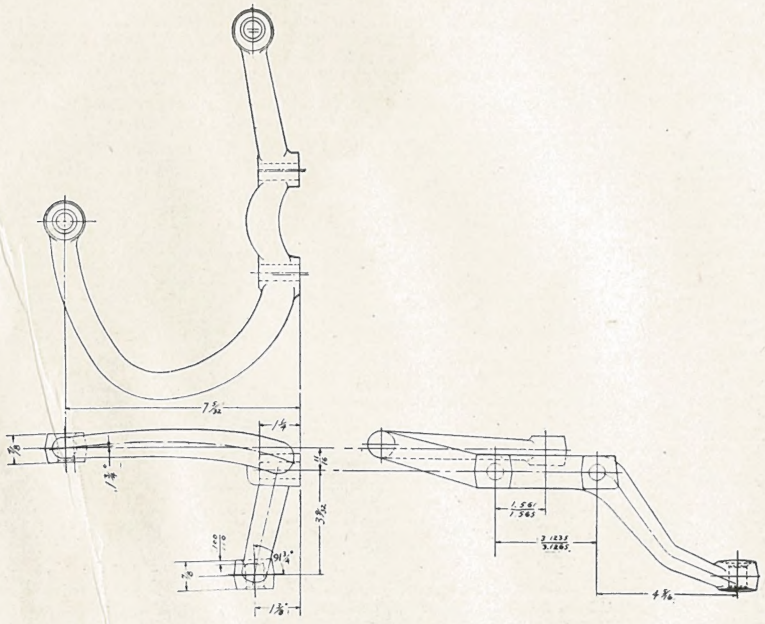

Fig. 62. Steering Arm, Left—Dimensions

Front Axle and Wheel Alignment

1. See that the Car is Setting on a Level Floor.
2. Balance Front Wheels, Tires, Check Tire Pressure.
3. See that the Tires Run True and do not Wabble.

   This is done by tightening and loosening rim wedges as required.
4. Front Wheel Bearings Must Have Proper Adjustment.

Wheel bearings should be adjusted when shake can be felt on wheel. This shake, however, must not be confused with that resulting from play in king pin bushings. When adjustment is necessary, remove hub cap, jack up wheel, remove the cotter pin from the bearing nut and turn nut up tight to make sure that all looseness has been removed. Then back off nut slowly until slight shake can be felt on wheel. Then tighten nut ⅙ of a turn maximum and insert cotter pin.

5. Check Toe-in of Front Wheels.

See Fig. 64.

For wood wheels the distance X should be 1/8" to 3/16" less than Y, for wood, wire and disc wheels the distance A should be 9/32" to 11/32" less than B, or J should be 7/32" to 9/32" less than K, it being necessary to check at one point only—toe-in is adjusted by loosening two tie rod collar clamps bolt C and turning the center portion of tie rod which has right and left hand threads at ends. Be sure to tighten clamp bolts after proper toe-in is obtained.

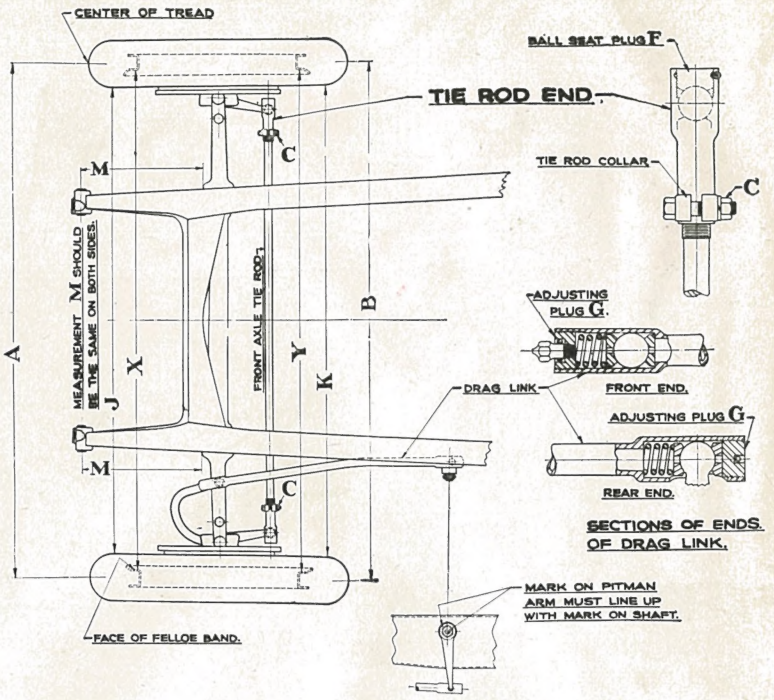

Fig. 64. Wheel Toe-in

6. Check Camber of Front Wheels. See Fig. 63.

The tires should be closer together at the ground than at the top. D should be 5/16" to 1/2" greater than E.

7. Take Looseness out of Front Axle Tie Rod. See Fig. 64.

This is done by tightening plugs G so that the rod can just be rotated by hand.

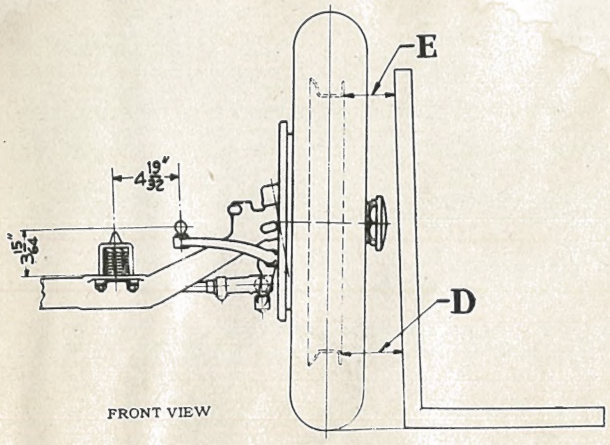

Fig. 63. Wheel Camber

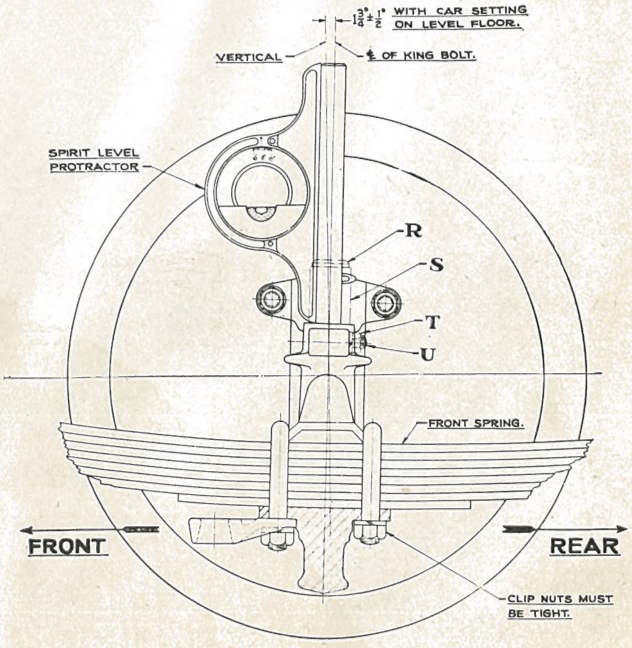

Fig. 65. King Pin Angle

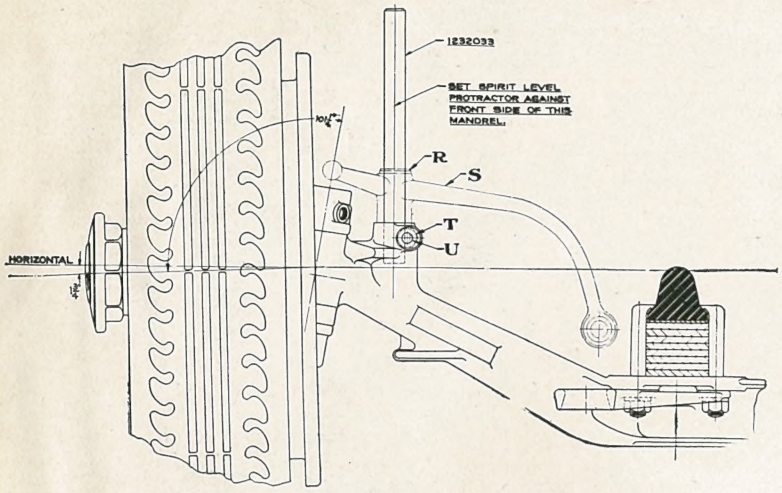

Fig. 66. King Pin and Spindle Angle

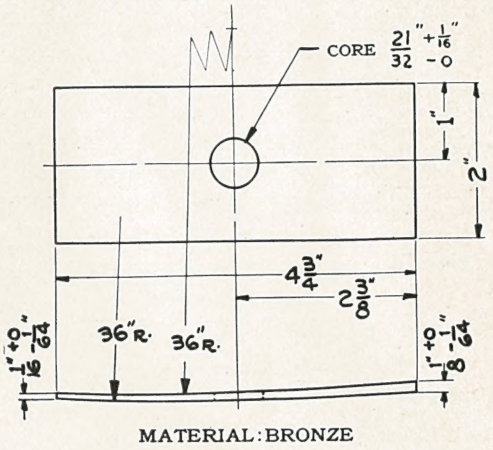

Fig. 68. Shim Details

8. Take Looseness out of Drag Link.

   Tighten plug F down tight and back off one turn.

9. Check Angle of King Pins. See Figs. 65 and 66.

   To do this, remove nut T, draw bolt C, pin R and brake lever S; insert mandrel No. 1232033 and with a spirit level protractor against the front side of mandrel determine angle. The king pin must slant back at the top 1¼° to 2¼°. If the top of king pin slants forward, use shim as shown in Fig. 68.

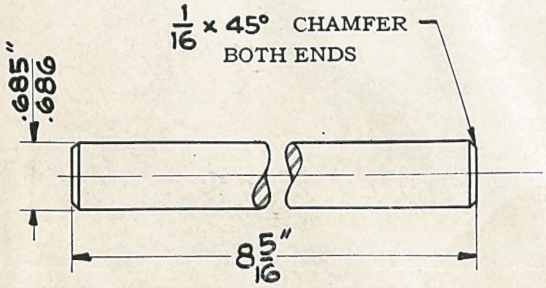

Fig. 67. Mandrel Details

10. Take Back Lash out of Steering Gear.

    Adjust to remove the back lash when wheels are in straight ahead position.

11. Check Height of Steering Arm Ball.

    Steering arm ball should be 3 15/64" from spring pad. Check ball and bend steering arm if necessary to raise ball.

    See Fig. 63.

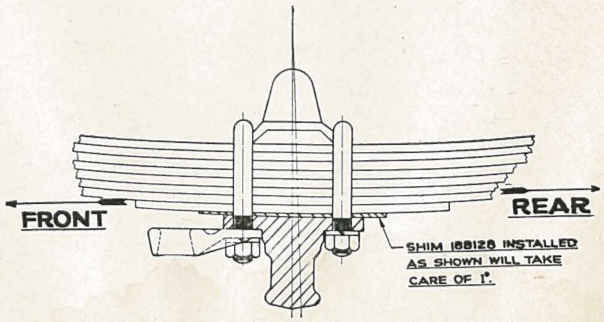

Fig. 69. Shim Installed

Wheels

Standard equipment wheels are 10-spoke artillery type with steel felloes.

Spoke width	1¼"
Felloe diameter—at outside leg	17 5/8"
Hub flange diameter	7¼"
Flange bolts	Ten—⅜"
Rim lugs	Four

Wheel Bearings

Front wheel bearings are adjustable cup and cone type.

Inner bearing.....Eleven 9/16" balls
Outer bearing.....Nine 15/32" balls

Rear wheel bearings are Hyatt bearing heavy duty type.

Number of rolls.....13
Diameter of rolls.....1/2"
Hyatt.....No. R. A. 307

Rims

Rims are formed with centering bosses which rest on the outside leg of wheel felloe to ensure central mounting.

Rim stock.....1/8"
No. wedges.....Four
Rim base—Outside diam.....18"
Section.....4"

Tires

Tires are low pressure type of four-ply construction.

Tire size.....28" x 5.25"
Rim size.....18" x 4"
Tire pressure.....35 lbs. front and rear
For high speeds.....38 lbs. front

Springs

Semi-elliptic springs are used both front and rear. Front springs are overslung and rear springs underslung on the axles. Front ends of both front and rear springs are attached to the frame by spring bolts in bronze spring eye bushings. Rear ends of both front and rear springs are attached to the frame by self-adjusting shackles.

Springs should not be lubricated any more than necessary to prevent squeaks.

Front Spring

Length.....35"
Width.....2"
Bolts.....9/16" diam.

Rear Spring

Length.....54 1/2"
Width.....2"
Bolts.....5/8" diam.

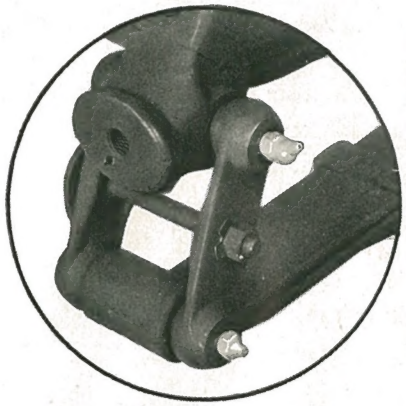

Fig. 70. Rear Spring Shackle

Spring Shackles

Spring shackles at the rear ends of both front and rear springs are self-adjusting type. The shackle pins are hollow and pressed into the spring eyes and frame hangers. The ends of these pins are tapered and extend into tapered holes in the shackles. The shackles are held together by

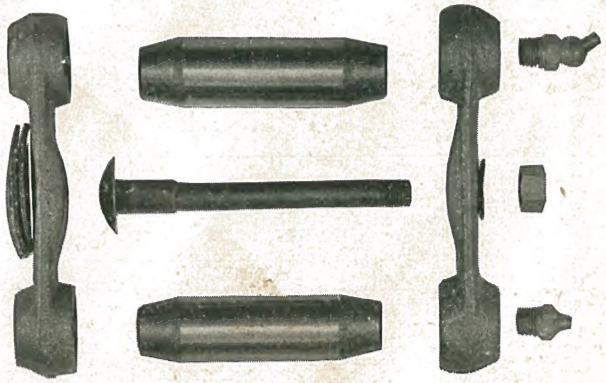

Fig. 71. Shackle Disassembly

a bolt through their centers. Under the head of this bolt are two springs which maintain a constant pressure of the shackles against the tapered ends of the pins and consequently prevent shackle rattle. Zerk connections are provided for lubrication through the center of the pin to the bearing of the tapered ends of the shackles.

Brakes

Four wheel internal duo-servo type brakes are used. This type utilizes the force of the momentum of the car to increase braking power. The servo principle is self-contained, and automatic, and is had without the use of auxiliary devices. It is attained through the method of anchoring the shoes, by the operation of the shoes, and by the use of the frictional contact of the shoes with the rotating drum to apply the shoes against the drum.

The primary shoe is not anchored but hinges freely by means of an articulating pin, to the floating end of the secondary shoe. When the brake is applied the rotating drum carries the primary shoe against and with the drum, imparting power to the secondary shoe and wrapping the assembly of the shoes increasingly tighter against the drum as the pedal pressure is applied.

A light pedal pressure is multiplied to a smooth powerful braking action, instantaneous in application and release.

This type of brake has a servo action both forward and backward. The two shoes are identical in size and shape. At the camshaft are two anchor pins, one of which serves as the anchor or buttress for braking in the forward direction and the other serves as the anchor or buttress for braking in the reverse direction.

The two shoes are linked together at the opposite ends by a right and left hand screw

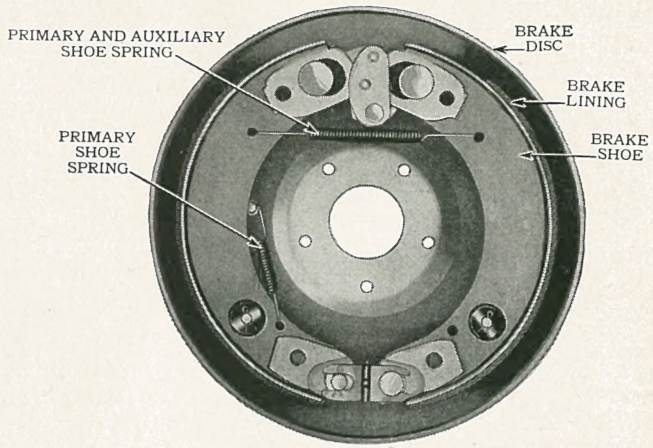

Fig. 7. Brake Assembly

through articulating pins in a manner to provide extreme flexibility in their tendency to align themselves with the inner surface of the drum.

The shoes are expanded by means of the balanced cam, which does not change its angularity during the entire life of the brake lining. The two trunnion blocks bear on the curved ends of the shoe webs and provide compensation for the movement of the shoes, and for any unequal wear.

In forward rotation the forward shoe assumes the position of the primary shoe and the other that of the secondary shoe. In the reverse direction the rear shoe assumes the position of primary and the other that of secondary. The shoes are centralized in the drum to prevent dragging when in the released position by a simple roller eccentric adjusted from the outside of the drum. There is only one adjustment for wear, the turning of the right and left hand adjusting screw, which by its rotation through the articulating pins, draws the shoes together or spreads them apart.

This break system has been designed for simplicity of construction, ease of adjustment and maximum safety.

Briefly, the system consists of a pedal and a hand lever, operating independently

on the single cross shaft which is supported in self-aligning bearings in such manner that the operation of the shaft is not affected by frame distortion.

The brake shoes are operated from the cross shaft, through levers and pull rods.

A safety bearing is provided near the center of the cross shaft which will keep the shaft in alignment and allow the brakes to be operative even though the shaft should be broken on either side of the bearing.

A hand brake lever is provided by which the four wheel brakes may be applied for parking purposes. Either the pedal or hand lever may be used independently of the other.

The hand lever has a greater travel than the pedal for the purpose of providing braking action even though the linings should be worn to the extent that the service brakes become inoperative.

After the levers and pull rods have been set to proper positions, and the joints and bearings properly lubricated periodically, further adjustment is required only to compensate for wear of linings. The adjustment is easily made at the brake shoes without removing the wheels.

Brake Diamensions

Drums—Inside diam .....12″
Facing—8 pieces.....1¾″ x 13″
Brake area.....182 sq. in.

BRAKE ADJUSTMENT

Make the Following Checks Before Making Any Brake Adjustments

See Fig. 73.

1. All parts must be working freely. Lubricate all working parts.
2. In release position, cross shaft (1) must return freely to stop pin (2).
3. Remove all slack from foot pedal (3) and hand brake lever (4) by adjusting rod (5) for foot pedal, and rod (6) for hand brake lever. When all slack is removed, cross shaft lever (7) must be against stop (2), foot pedal (3) must be against rubber pad and hand brake lever (4) must be in full released position. Rod (5) should be in upper hole in pedal.
4. Disconnect brake rods (8), (9), (10), (11). Operate each brake separately by hand, pulling levers (14) and (13), to see that brakes release freely. Before rods are connected, adjust the lengths so as to allow approximately 1/64″ back lash in brake operating levers (12), (13).
5. The center of ball on operating lever (14) should be over or slightly to rear of center line of king pin, the position of rear control lever (13) should be set so that the distance from lever eye to outside of axle housing is 2⅞″ plus or minus ⅛″. If the brake levers (12) and (13) are not in the correct position they can be relocated on serrations of brake camshaft.
6. Replace cotter pins and tighten lock nuts on adjusting rods.
7. Tighten all spring clip nuts.
8. Check front wheel bearings for looseness. Wheel bearings should be adjusted when shake can be felt on wheel. This shake, however, must not be confused with that resulting from play on king pin bushings. When adjustment is necessary remove hub cap, jack up wheel, remove the cotterpin from the bearing nut, and turn nut up tight to make sure

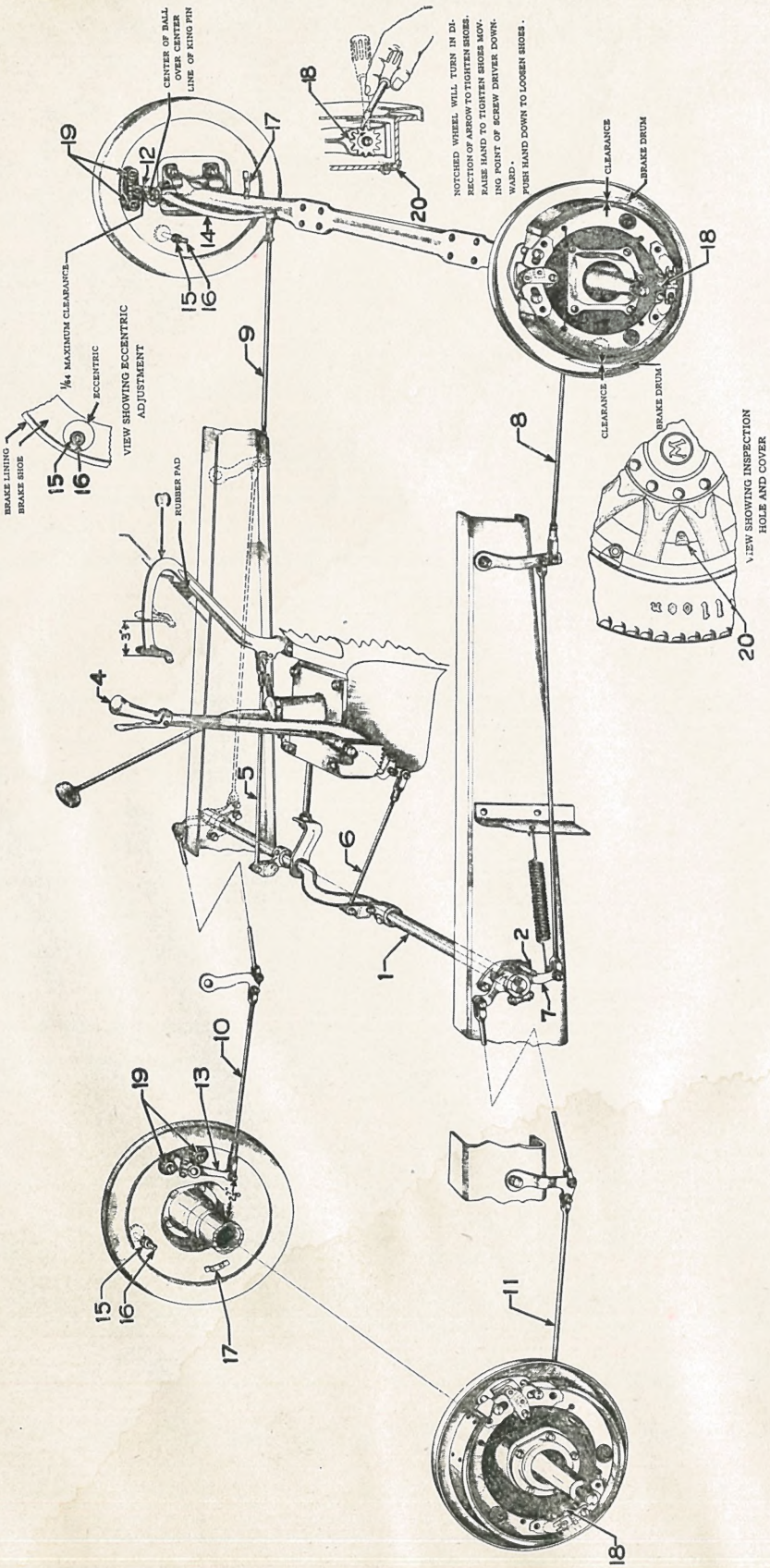

Fig. 73. Brake Adjustment Chart

all looseness has been removed. Then back off nut until wheel turns freely. Tighten nut 1/6 of a turn maximum and insert cotterpin.

9. Check rear wheels for looseness. They must be drawn up tight on tapers of axle shafts.

Adjustments for Wear and Equalization

1. Jack up all four wheels of car. Set front wheels straight ahead.

2. Centralize shoes as follows: Loosen nut (15) on eccentric stop (16) and turn eccentric in the direction wheel rotates when going forward, until a slight drag is felt on wheel; then turn eccentric in opposite direction until wheel is free. Tighten lock nut while still holding eccentric with wrench.

3. Depress pedal (3) 3″, and with suitable means hold pedal in that fixed position.

4. Remove adjusting hole covers (17) from brake discs, insert screw driver or other suitable tool. and turn notched wheel (18) inside of brake drum until brakes drag so that wheel can just be turned with two hands. Adjust shoes so that all wheels require the same hard pull to rotate them. Diagram shows method of tightening or loosening shoes for adjustment.

5. Release pedal (3). Wheels should turn freely without drag between drums and brakes. It may be necessary in some cases to re-centralize shoes if they drag. Proceed as in paragraph No. 2.

6. Remove car from jacks and test on road.

Major Adjustments

Anchor pins should be adjusted only when fitting new lined shoes, or when anchor pin nuts are found loose. If necessary to adjust anchor pins proceed as follows:

(a) Jack up all four wheels.

(b) Loosen anchor pin nuts (19) free of lock washers. Loosen lock nut (15) on eccentric adjustment (16) and turn eccentric in direction wheel rotates, when going forward, until a slight drag is felt on the wheel. Still holding eccentric with wrench, tighten lock nut slightly to hold eccentric in temporary position.

(c) Remove cover plate (17) and tighten shoes by inserting screw driver in cover plate hole and revolving notched wheel (18) until wheel can be pulled over with one hand.

(d) Tighten anchor pin nuts (19) with 16″ wrench.

(e) Insert screw driver in cover plate hole and loosen shoes by revolving notched wheel (18) approximately 15 notches. Back off eccentric adjustment (16) until wheel turns freely, holding eccentric with wrench while tightening nut (15).

(f) Set front wheels straight ahead. Follow instructions (3), (4), (5) and (6) under "adjustment for wear and equalization."

Shoe clearance can be checked with feeler gauges by removing inspection hole covers (20) in brake drums. This is unnecessary if the above instructions have been carefully followed.

When the proper adjustments have been made, the clearance between the lining and drum at anchor pin end of shoes will be approximately. 010″ and at the adjusting end of shoes approximately .015″.

Steering Gear

Steering gear is Jacox worm and split nut type. The half nuts, made of special bronze, have fine threads in contact with the worm with consequent low unit pressure and minimum wear. Half nuts are guided in the housing for their full length. Hardened and ground steel blocks attached to the lower ends of half nuts contact with hardened and ground steel rollers on the cradle end of Pitman arm shaft. Pitman arm shaft is supported in bronze bushings in the housing.

The steering tube is supported at the upper end in an oilless bushing. A self-centering ball thrust bearing is placed between the upper end of the worm and the adjusting nut at the top of housing. This nut provides adjustment for wear of half nuts and worm.

The nest tubes are separated by spring type ferrules to prevent rattle.

Steering gear is supported at the housing in a trunnion bearing attached to the frame and at the mast jacket by a slotted bracket attached to the instrument panel which allows adjustment for position of steering wheel.

Steering wheels are ebony finished wood rims mounted on black enameled spokes. The large diameter hub prevents the fingers being caught between the light and throttle levers and the wheel spokes.

Steering Gear Details

Ration . . . . . 16 to 1
Worm diameter . . . . . 1¾″
Steering tube diameter . . . . . 13/16″
Mast jacket diameter . . . . . 1½″
Pitman arm shaft, dia . . . . . 1⅛″
Pitman arm—Length . . . . . 7″
Pitman arm shaft bearing—
Length . . . . . 4⅝″

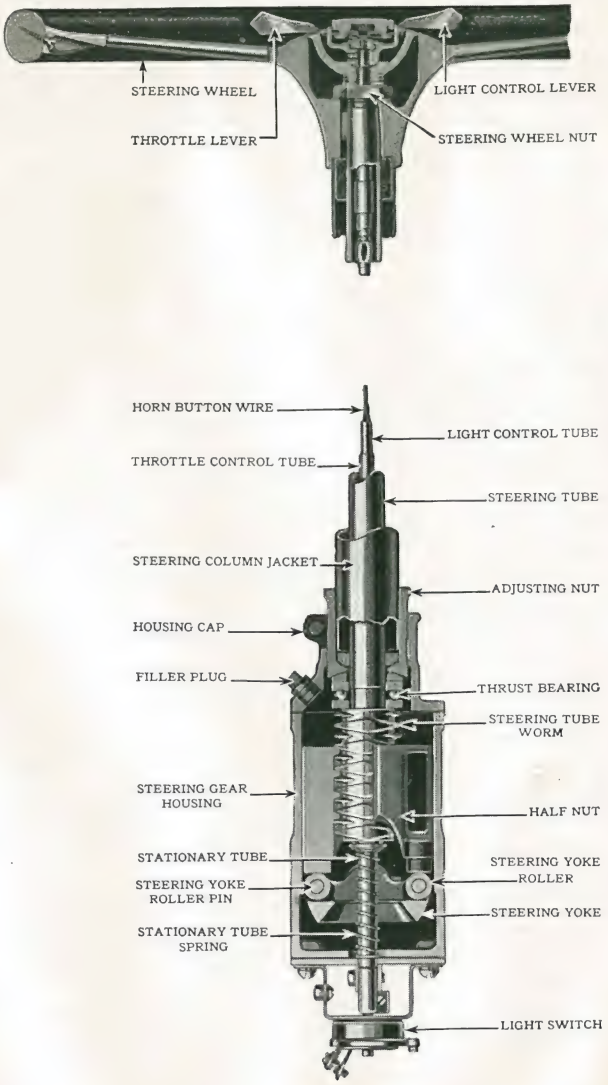

Fig. 74. Steering Gear—Sectional

Steering wheel diameter . . . . . 17″
Turning circle diameter . . . . . 38.6 ft. right or left.

Pitman Arm

Pitman arm, of drop forged and heat treated steel, is splined to the Pitman arm shaft. A hardened and ground steel ball integral with the lower end connects with the steering connecting rod.

Steering Connecting Rod

The steering connecting rod is made of

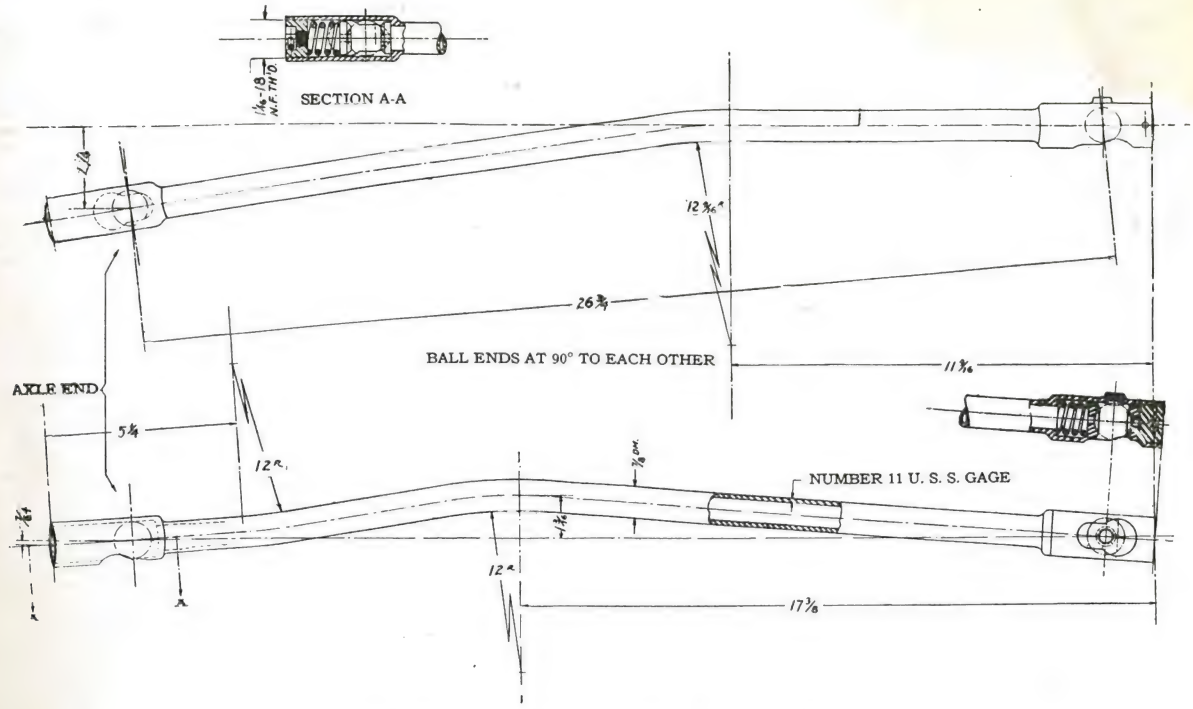

Fig. 75. Steering Connecting Rods—Details

seamless steel tubing with swaged ends carring split socket plugs. The rear socket is provided with a spring to relieve Pitman arm of road shocks.

Tubing dia. . . . . 7/8"
Wall thickness . . 11 Gage

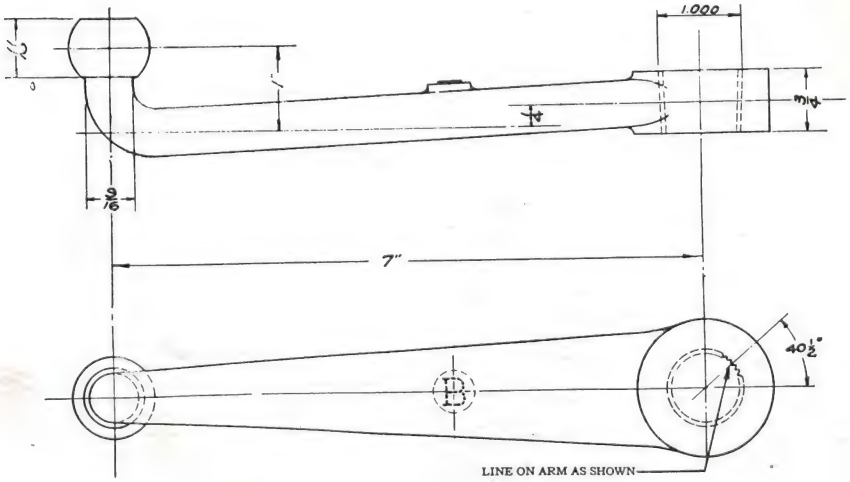

Fig. 76. Pitman Arm—Details

Speedometer

AC 80-mile speedometers are used on all models.

The speedometer drive gear is keyed to the front universal joint companion flange and the driven gear is supported in the rear cover plate of the transmission.

The gears are lubricated automatically from the transmission.

Speedometer Gears

Driven 16-T
Driving 5-T

Fig. 77. Speedometer Drive Gears

Shock Absorbers

Lovejoy shock absorbers are supplied as regular equipment front and rear on all models. These have been calibrated to function properly with the springs of each model to provide best riding qualities.

The size of the by-pass valve is indicated by the number stamped on the heads of the valve nuts as given in following table:

Models 30-35-36-36S

Rear—	Right	1511E -3C
	Left	1511F -3C
Front—	Right	1512L -2C
	Left	1512M-2C

Model 34

Rear—	Right	1511E -5C
	Left	1511F -5C
Front—	Right	1512L -3B
	Left	1512M-3B

Model 37

Rear—	Right	1511E -2C
	Left	1511F -2C
Front—	Right	1512L -2B
	Left	1512M-2B

Frame

The frame side rails are made of heavy pressed steel channels, 5½″ deep x 3″ wide x ⅛″ thick. The lower flange is rolled downward throughout the central portion to stiffen the channels. Five heavy cross members are rigidly gussetted to the side rails. The front cross member, which also supports the front end of the engine and the radiator, is exceptionally heavy to prevent weave of radiator and hood.

The rear end of frame has a "kick up" over the rear axle to allow sufficient "ride" of the rear springs and to provide low car appearance. The side rails taper from a width of 28″ at the front to 44⅜″ at the rear to provide short turning radius of front wheels and furnish an extremely wide mounting for the body.

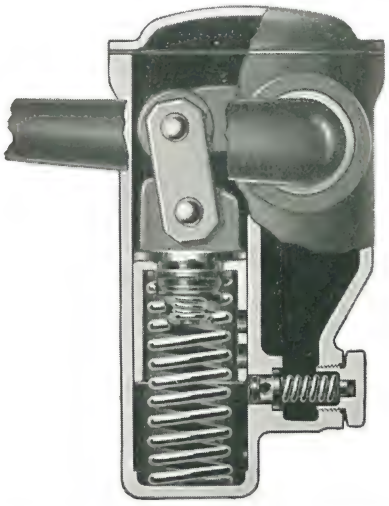

Fig. 79. Cut-a-Way Shock Absorber

Chassis Lubrication

Zerk high pressure lubrication system is used on the chassis. Hand gun is included in the tool kit.

Tire Carrier

Full circle type carrier is supplied as regular equipment. It is attached to the rear of the frame by two pressed steel brackets.

Starting, Lighting and Ignition

The Delco-Remy system of starting, lighting and ignition is used. This system is a six-volt, single wire or grounded type, the engine and frame of car forming the return side of the circuit. The negative pole of the battery is grounded to the side member of frame and the front engine arm to the front cross member by flexible copper straps.

The equipment consists of the following units:

	Model	Buick Part No.
Starting motor	714H	1835377
Generator	943K	829717
Lighting switch	486B	824515
Ignition coil	528Q	1835307
Distributor assembly	639Y	829739
Signal lamp switch	466G	892251
Current limit relay	410A	820871
Cut-out relay	265G	827842
Horn	K-18B	829749
Instrument board switch		228820
Signal lamp		910406
Signal lamp		910407
Battery—13 plate	3-VXA-13-1	227588

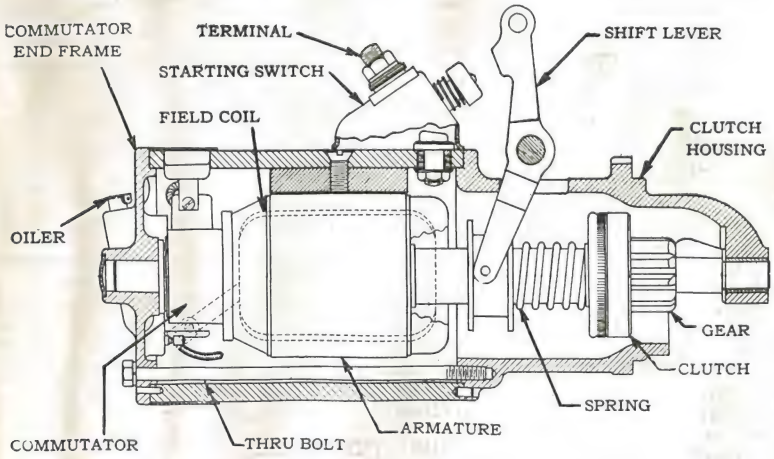

Fig. 80. Starter—Sectional

Starting Motor

The starting motor, mounted on the flywheel housing at the left side of the engine, is a direct drive mechanical shift type. It is a four-pole unit with field coils connected in series with the armature. Two plain bronze bushings support the armature shaft. Engine oil should be used for lubrication of the outer bearing. Inner is self-lubricating.

Engagement is made with the flywheel through the drive gear unit, which consists of a pinion, spring, shifting collar and over-running clutch. This unit is mounted on the splined armature shaft and is moved endwise by the shifting yoke. The yoke is connected to starter pedal by a cross shaft.

Initial movement of starter pedal moves pinion into engagement with the flywheel ring gear and further movement closes the starter switch, causing the armature to revolve and crank the engine. If the alignment of pinion and ring gear teeth is such that they do not mesh, the spring behind the pinion compresses and when the armature begins to rotate forces pinion into engagement. The over-running clutch automatically disconnects the drive unit from the armature shaft to prevent the flywheel driving the armature at high speed before the starter pedal is released.

The flywheel teeth are cut in a heat treated steel ring shrunk on and welded to the flywheel

No. flywheel teeth 114

No. pinion teeth 9

Pitch 8–10

Reduction 12.66

Generator

The generator is mounted at the left side of engine and driven by the V type water pump and fan belt. Its position may be adjusted to provide proper tension on belt.

Generator is a two-pole shunt wound unit, with third brush and thermostat regulation of charging rate. The armature is driven at 1½ times crankshaft speed in a clock-wise direction looking at the front end.

The generator starts charging at a car speed of 8 to 10 miles per hour. Below this speed, current is drawn from the storage battery. A cut-out relay is provided to prevent battery from discharging through generator below charging speed.

Control of the charging rate is by a third brush on the commutator and a thermostat in the circuit. The ordinary type of shunt wound generator furnishes a current that increases with the speed. A third brush applied to a shunt wound generator produces a current output that reaches its maximum at a car speed of approximately 25 miles per hour and automatically decreases above that speed. The third brush is mounted on a movable plate locked to the housing by a screw. Adjustment is made by loosening the screw and shifting the position of the brush in the direction required.

Armature is supported by a ball bearing at the front end and a plain bronze bearing at the rear. Engine oil should be used for lubrication.

The thermostat is an automatic switch which allows the maximum flow of current when generator is cold and which reduces the charging rate as the generator becomes hot. Because of this unit, it is unnecessary to change the third brush setting for winter or Summer driving.

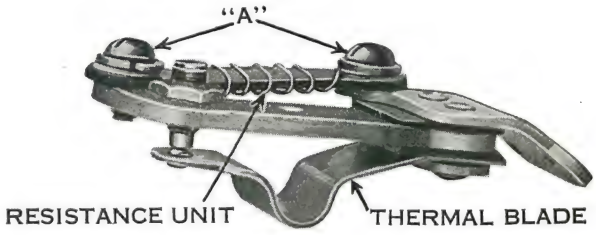

Fig. 82. Thermostat Unit

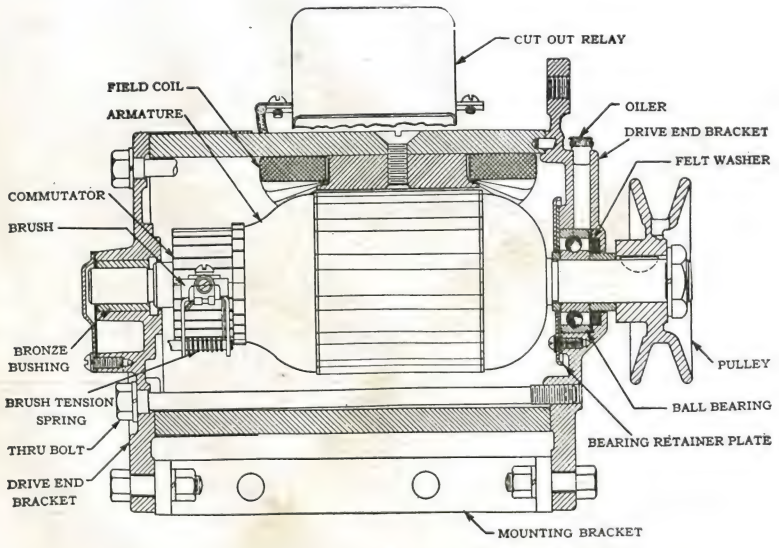

Fig. 81. Generator—Sectional

Cut-Out Relay

The cut-out relay mounted on the generator is magnetically operated. It closes the circuit between the battery and generator when the voltage of the current generated exceeds that of the battery. It opens the circuit when the generator voltage drops below that of the battery thus preventing discharge of battery through the generator.

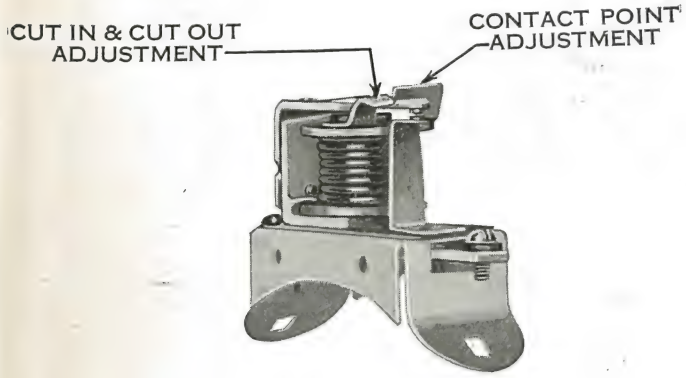

Fig. 83. Cut-Out Relay

Distributor

The distributor is mounted above the cylinder head and is driven by a spiral gear on the camshaft at one-half crankshaft speed. It is a combined automatic and manual spark advance type. The automatic governor advances or retards the spark in proportion to the engine speed, eliminating the necessity of frequent use of the spark control button on the instrument board.

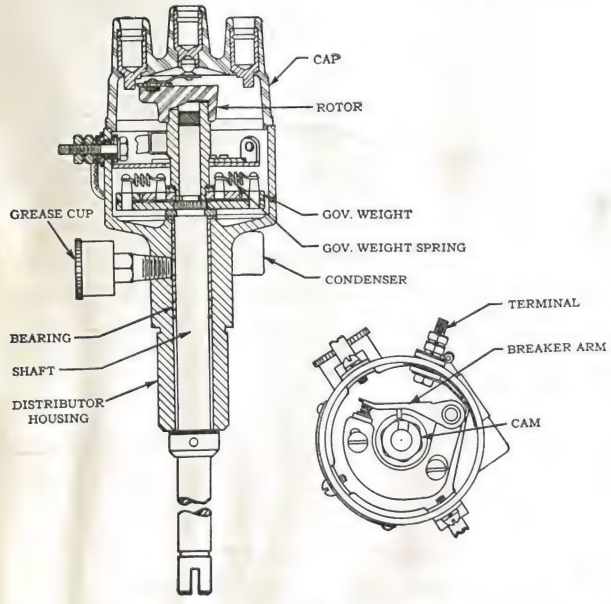

Fig. 84. Distributor—Sectional

The distributor in the fully advanced position is set to fire 7° before upper dead center, measured on the flywheel.

The automatic advance cuts in at an engine speed of 400 to 600 R. P. M. and gradually advances the spark 19° to 23° giving a total advance of manual and automatic of 33° to 37°.

Condenser

The condenser contained in a water proof metal case is mounted on the side of the distributor housing. Its purpose is to protect the breaker points against corrosive action of sparking and to utilize the tendency to spark to build up a higher voltage in the high tension circuit than would otherwise be obtained. It is connected in parallel with the breaker points but the current does not pass through the condenser and on test should show an open circuit.

Ignition Coil

The ignition coil is mounted on the back of the instrument board. Its purpose is to convert the low voltage primary current from the battery or generator to a very high voltage capable of jumping the gap in the spark plugs.

Because of the type of winding employed no resistance unit is required with this coil. The primary winding is outside the secondary winding. The increased diameter thus obtained adds sufficient wire to the primary circuit to produce the proper resistance value. The resistance in the secondary circuit is low due to the small diameter of the winding which materially adds to the efficiency of the coil.

This type of coil produces an exceptionally hot spark with a low consumption of current and increases the life of the breaker points. The ignition switch and lock are coincidental and mounted on the coil.

Spark Plugs

AC type G12 metric plugs are used. Gap should be .025″ to .030″.

Ignition Timing

When timing ignition, breaker points should always be adjusted first as shown in Fig. 85.

CAUTION: Always recheck timing after adjusting breaker point opening.

1. Remove spark plug from No. 1 cylinder, as shown in Fig. 86, and crank engine by hand until piston in this cylinder starts upward on its compression stroke. This can be determined by placing thumb over spark plug hole. Continue to crank engine slowly, after uncovering the timing inspection hole on left side of flywheel housing, as shown in Fig. 87, and watch for the "7° advance" mark on flywheel. This mark should be lined up with the corresponding mark on the flywheel housing.

2. Fully advance the spark, as shown in Fig. 88, by making sure that control knob (A) on the instrument board is pushed all the way in, and that the stop screw (B) is at the extreme end of the slot in the timing clamp of the distributor.

3. Remove distributor cap and see that rotor is in line with slot in upper edge of housing, as shown in Fig. 89. This slot should then point toward right side of engine. The high tension wire attached to the terminal directly above the slot should then connect with the spark plug in No. 1 cylinder, the other wires connecting to their respective cylinders in the following order and in a clock-wise direction: 1-5-3-6-2-4.

4. Loosen the timing clamp screw (E) and rotate housing, as shown in Fig. 90, in a counter-clockwise direction until the breaker points just barely open. View (C) in Fig. 89 shows the position of the rubbing block (D) on the

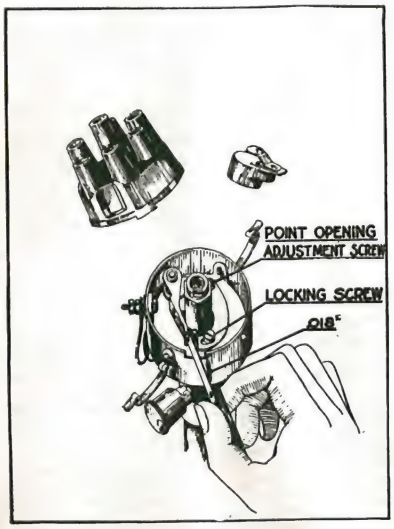

Fig. 85. Braker Adjustment

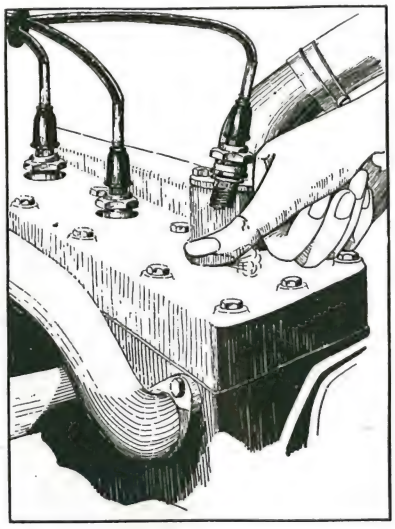

Fig. 86. Determining Dead Center

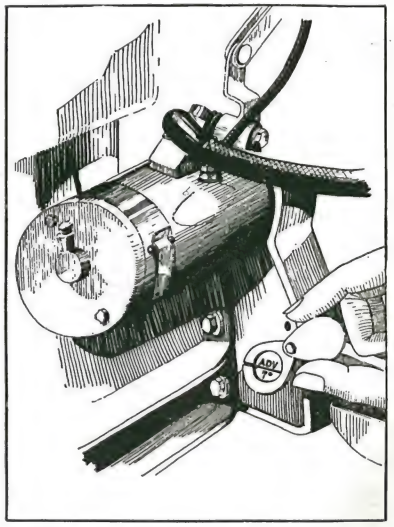

Fig. 87. Flywheel Marking

Fig. 88. Spark Advanced

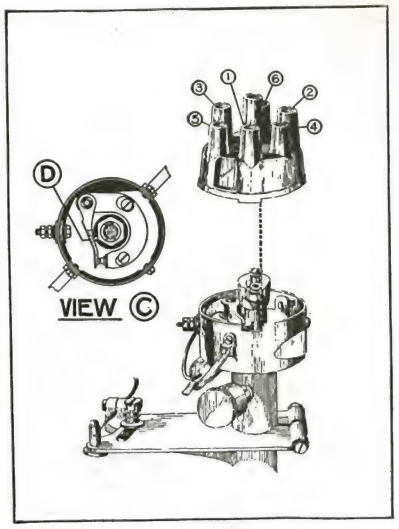

Fig. 89. Rotor Setting

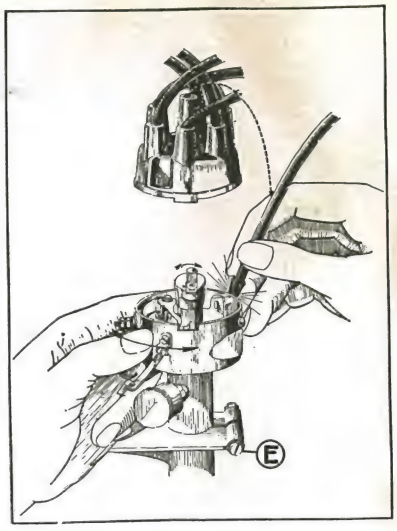

Fig. 90. Checking Timing

cam when spark occurs. This can be determined by turning on the ignition and holding the wire which connects to the center terminal on distributor cap to form a gap with the metal parts of the housing, as shown in Fig. 90. Tighten adjusting clamp securely, making sure that distributor housing is not moved during this operation.

Head Lamps

The head lamps have an adjustable mounting on a tie rod between the fenders and are supported on rigid posts. Special reflectors and lenses are used and the bulbs are two filament type, both filaments being of the same candle power.

Head Lamp Adjustment

Head lamps should be adjusted to comply with provincial or local requirements. Reference to Fig. 92 will show the pattern of beams from both lamps when correctly adjusted. This adjustment will be obtained by observing the following procedure:

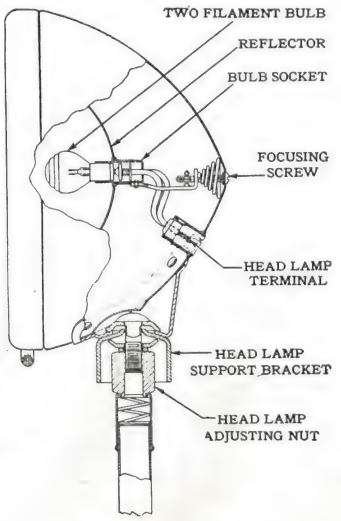

Fig. 91. Head Lamp

1. Place the car on a level floor with a garage door or other light colored vertical surface 25 feet ahead. Draw a horizontal line on this vertical surface at a level 4″ below the height of the lamp centers, this allowance being made to compensate for the position of head lamps when car is fully loaded. Sight through the center of the rear window over the radiator cap, and so determine a point on the horizontal line midway between the lamps. Lo-

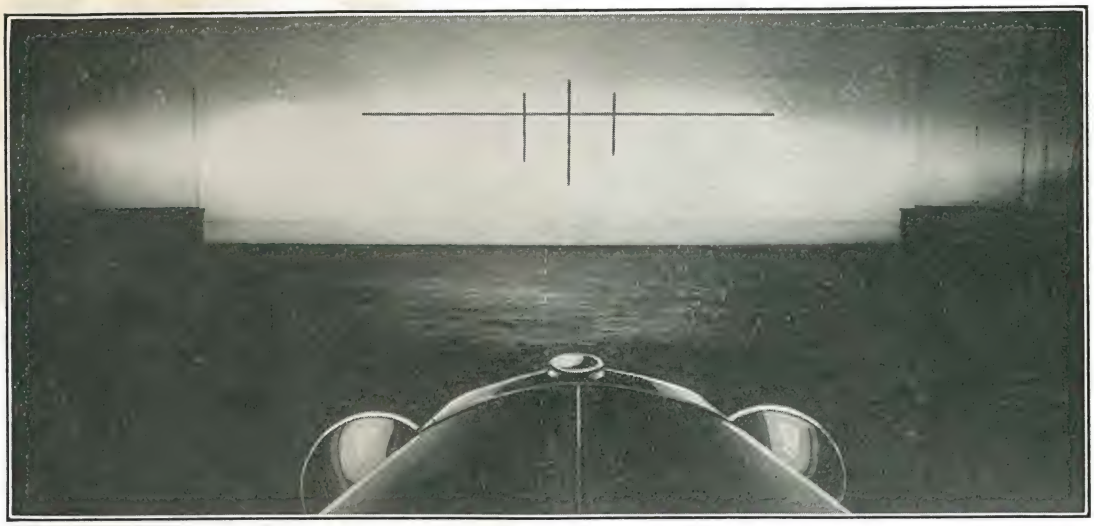

Fig. 92. Head Lamp Adjustment

cate points on both sides of this center point directly ahead of the center of each head lamp.

2. Switch head lamps on, place lighting control switch on steering wheel in position marked brt. (bright).
3. Cover one head lamp to obscure the light beam, while adjusting the other. Turn the focus adjustment screw on the back of the uncovered lamp until a beam is obtained having highest intensity at the top and a sharp upper outline and as narrow as possible, measured from top to bottom. Loosen the mounting nut, aim the lamp so that the top of the beam conicides with the horizontal line on the vertical surface, and is equally divided by the vertical line directly ahead of the head lamp center. Tighten the head lamp adjusting nut securely and check the position of the beam to see that it has not changed.

When installing new bulbs always check the head lamp focus to insure against glaring and illegal lights and to provide proper road illumination.

In replacing parts always use genuine parts such as furnished with original equipment.

Current Limit Relay

The current limit relay is mounted on the inside of the dash panel. This device protects the lighting circuits, switch and battery. The normal flow of current does not affect the relay but in the event of a ground

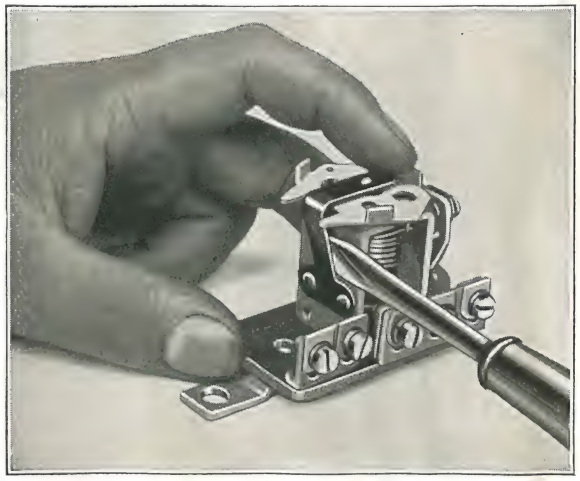

Fig. 93. Current Limit Relay

in any circuit the relay intermittently breaks the flow of current. The clicking sound from the relay gives a distinctive warning that the short exists and this clicking will continue until the ground is removed or the switch is operated to cut off the defective circuit.

Lighting Switch

The lighting switch is mounted at the base of the steering gear and is operated by a lever above the steering wheel. The four positions of the switch are as follows:

Parking position—Lights the cowl lamps and the tail lamp.

Dim position—Lights the upper filaments of head lamps, which throw the beams directly ahead of car for a passing or courtesy light. This position also lights the tail lamp.

Bright position—Lights the lower filaments of the head lamps, throwing the beams farther ahead than when dim position is used. This position also lights the tail lamp.

Signal Lamp

The signal lamp mounted on the frame side member is a combination stop lamp, tail lamp, and license illuminating lens. Two bulbs are used, one for the tail lamp and license illumination, and the other for the stop lamp.

Signal Lamp Switch

The signal lamp switch, controlling the stop light, is mounted on the left rear engine arm and operated by the brake pedal. Adjustment of the connecting rod should be such that the contact is had in the switch when the pedal travels 3½″.

Instrument Board Switch

A switch located at the lower edge of the instrument board controls this light for the instruments and the front compartment.

Lamp Bulbs

	Candle Power
Head lamp	21
Cowl lamp	3
Tail lamp	3
Signal lamp	15
Dome lamp	6
Front compartment and instrument lamps	3

Horn

Horn is a Klaxon vibrator type, Model K-18-B, mounted on the cylinder head at the left side.

Storage Battery

Battery is Exide, Type 3-VXA-13-1, 13-plate, 6-volt, 85 ampere hour capacity.

Special Cylinder Head and Rear Axle Gears

Special high compression cylinder heads and special ratio ring gears and pinions are available. These are designed primarily for the Models 34, 35, 36 and 36S. They may also be used in all models.

This special head increases the compression ratio from 5.2 to 1 to 5.7 to 1. The special rear axle gears increase the gear ratio from 4.545 to 1 to 4.25 to 1.

When using special gear reduction it is necessary to change the speedometer driven gear assembly on rear of transmission to obtain correct speedometer readings.

This special material may be ordered from the parts department under the following parts numbers.

	PART NO.
High compression head	1233005
Ring gear	992728
Pinion	992729
Speedometer driven gear assembly	552750

To obtain the relation between engine revolutions and car speeds multiply the car speed in miles per hour by the factor 51.5.

Specifications

Engine

Type	L-head
No. of cylinders	6
Cylinder size	3 1/8" bore, 4 5/8" stroke
Displacement	212.8 cu. in.
S. A. E. H. P. rating	23.44
Actual brake H. P.	67.5 h. p. at 3000 r.p.m.
Torque—Maximum	144.5 ft. lbs. at 1200 r.p.m.
Compression—Corrected	98 lbs.
Compression ratio	5.2 to 1
Firing order	1-5-3-6-2-4

Crankshaft

Material	Special carbon steel heat treated
Weight	75 lbs.
Bearings—Diameter and Length	
Front	2 5/16" x 1 15/32"
Front center	2 3/8" x 1 1/2"
Rear center	2 1/2" x 1 1/2"
Rear	2 9/16" x 1 29/32"
Bearing studs—Each bearing	Two, 9/16" diam.

Camshaft

Material	Carbon steel—Hardened and ground
Bearings—Diameter and Length	
Front	2 1/16" x 1 3/16"
Front center	2 1/32" x 1 3/16"
Rear center	2" x 1 3/16"
Rear	1 25/32" x 1 1/16"

Connecting Rods

Material	Carbon steel
Length C. to C.	9 3/4"
Lower End Bearings	
Material	Babbitt
Diameter	2 1/8"
Length	1 3/8"
Cap bolts	Two, (7/16"x2 37/64")
Wrist pin diam.	13/16"

Valves

Material	
Inlet	Chrome nickel steel
Exhaust	Silchrome No. 1 steel
Clear Diameter	
Inlet	1 1/2"
Exhaust	1 3/8"
Lift	324"
Stem diam.	3/8"
Spring Pressure	
Valve open	65 to 71 lbs.
Valve closed	40 to 46 lbs.
Valve lash	.006" engine hot .007" engine cold
Timing	
Inlet opens	5° before upper dead center
Inlet closes	45° after lower dead center
Exhaust opens	45° before lower dead center
Exhaust closes	18° after upper dead center

Camshaft Drive

Type	Chain
Width	1 1/4"

Pistons

Material	Cast iron
Compression rings	2 above pin—1/8" wide
Oil control rings	1 above pin—3/16" wide

Lubrication System

Type	Pressure to main, connecting rod and camshaft bearings
Pump type	Gear
Oil pressure	40 lbs.
Capacity—Dry engine	6 qts.
Capacity—Refill	5 qts.
Oil filter	AC

Cooling System

Type	Circulating water thermostat control
Pump type	Centrifugal
Pump drive	V-belt
Radiator	Harrison, vert. flow ¼″ Hex., all copper
Core area (frontal)	430 sq. in.
Core thickness	2¼″
Capacity system	2½ gal.
Fan—Diam.	16⅞″
No. blades	4
Fan drive	V-belt
Water pump and fan shaft bear.	Rear, plain bronze; Front, porous bronze
Water pump and fan shaft lubr.	Rear, trans. lubr. front, oil

Carburetor

Make	Marvel
Type	Automatic air valve triple jet
Model	VM-3
Throttle Diam.	1 7/16″
Air valve diam.	1¾″
Choker diam.	1¾″
Heat control	Marvel automatic
Inlet manifold dia.	1 3/16″
Fuel feed	AC gas pump
Air cleaner	AC centrifugal type
Riser diam.	1¼″

Crankcase and Cylinder Block

Crankcase—Upper	Integral with cylinder block
Material	Cast iron
Cyl. head bolts	24-7/16″ dia. heat treated

Flywheel

Flywheel weight with ring	31 lbs.
No. teeth in ring	114
No. teeth in pinion	9
Ratio	12.66 to 1

Clutch

Type	9″ single plate
Area	64.8
Pedal reduction	55—1
Facing size	6⅛″ I.D. x 8⅞″ O.D. x ⅛″ thick

Transmission

Type	Sliding gear
Location	Unit with engine
Gear material	Chrome steel
Pitch of Teeth	
Counter shaft drive gear	7
Intermediate speed gears	7
Low and reverse gears	7-9
Gear Reduction—High	Direct
Gear reduction—Intermediate	1.75 to 1
Gear reduction—Low	3 to 1
Gear reduction—Reverse	3.857 to 1

Counter shaft bearing.....2 (⅞" diam. x 1¾") plain bronze
Clutch gear bearing —Front.....⅝" diam. x 11/16" Durex bushings
Main shaft pilot bearing.....Hyatt RA-135— 11 Rollers, 3/16". dia., ¾" I.D. x 1⅛" O.D. x 1½" long
Main bearing— Front.....N.D. No. 1208
Main bearing— Rear.....N.D. No. 1306
Idle gear bearing....⅞" diam. x 13/16" plain bronze
Speedometer driving gear teeth.....5—2.4% fast
Speedometer driven gear teeth.....16—2.4% fast
Lubricant required to fill.....2 pts. A-200

Chassis

Wheelbase.....114"
Tread—Front.....56 17/32"
Tread—Rear.....57"
Rim size.....18" x 4" x ⅛" thick
Tire size.....28 x 5.25
Wheel spokes.....Ten—1¼" thick
Frame width— Front.....28"
Frame width—Rear..44⅜"
Turning circle.....38.6 ft. (right and left)
Clearance—Front axle.....8⅛"

Rear Axle

Type.....Semi-floating
Housing material....Pressed steel
Drive—Final.....Spiral bevel
Axle shaft material..Manganese steel
Differential case.....Malleable iron
Differential type.....2-pinion
Wheel bearings.....Hyatt No. 307—13 rollers ½" x 1 1/16".
Pinion shaft bearings—Front...N.D. double row ball—No. 5306
Pinion shaft bearings—Rear....N.D single row ball —No. 1307
Differential bear.....N.D. single row ball —No. 0208
Lubricant required to fill.....2½ pts. A-200
Type drive.....Hotchkiss
Teeth in ring gear (all models).....50
Teeth in pinion gear (all models).....11
Reduction.....4.545 to 1

Propeller Shaft and Universal Joint

Diameter of joint....3⅞"
Diameter of pins....19/32"
Diameter of propeller tube.....2"
Lubrication.....Trans. lubr. A-200

Front Axle

Type.....Reverse Elliott
Section.....''I'' beam
Size of section.....2⅛" x 7/32" x 1¾" wide
Material.....High carbon steel
Tie rod location.....Rear
Spindle diam.— Large.....1 5/16"
Spindle diam.— Small.....¾"

King pin diam.....⅞″
Knuckle bearings....Two bronze, 1¼″ long
Vertical thrust bearings.....17 balls—¼″ diam.
Wheel bearings—
Inner.....N.D. No. 909024 cup and cone, 11 balls—9/16″ diam.
Wheel bearings—
Outer.....N.D. No. 909023 cup and cone, 9 balls—15/32″ diam.

Front Springs

Material.....Carbon steel
Type.....Semi-elliptic
How slung.....Over
Length.....35″
Width.....2″
Spring bolts—Front..9/16″
Shackle bolts—Rear. ⅞″ adjustable shackles
Eye bushing—
Material.....Bronze
Eye bolt lubrication.Zerk

Rear Springs

Material.....Silicon Manganese steel
Type.....Semi-elliptic—under slung
Length.....54½″
Width.....2″
Spring bolts—Front. ⅝″
Shackle bolts—Rear.. ⅞″ adjustable shackle
Eye bushing material.....Bronze
Eye and shackle bolt lubrication....Trans. lubricant

Brakes

Service
Type.....Mechanical—Duo Servo Internal shoe
Location.....Front & Rear wheels
Drums—Inside diameter.....12″
Type of lining.....Molded to shape
Facing sizes.....1¾″ x 13″—8 pieces
Brake area.....182 sq. in.
Hand brake lever operates service brakes

Steering Gear

Make.....Jacox
Type.....Worm and split nut
Wheel diam.....17″
Ratio.....16 to 1
Steering tube diam...13/16″
Steering jacket diam..1½″
Thrust bearing.....12 balls—¼″ diam.

Electrical System

Starter, generator....Delco-Remy
Distributor.....Delco-Remy
Starter reduction.....12.66 to 1
No. teeth in pinion..9
Voltage of system....6
Generator charging rate—Cold.....18-20 amps.
Generator speed to crankshaft.....1½ to 1
Distributor point opening.....018″ to .025″
Spark plug.....AC—G12
Spark plug gap.....025″ to .030″
Head lamps.....Tilt ray
Double filament bulb.21-21 C.P.
Tail and side.....3 C.P.
Instruments lamps...3 C.P.
Dome lamp.....6 C.P.
Stop lamp.....15 C.P.
Battery—Exide.....3VXA13-1
Capacity.....85 amp. hrs.
No. plates.....13

Dimension Limits

ENGINE

	Limits for Fitting New
Cylinders and Pistons	
Piston clearance in cylinder bore with feeler ½" wide	.0015"-.0025"
Piston ring gap	.010" -.015"
Piston ring side clearance in groove	.001" -.0025"
Main and Connecting Rod Bearings	
Connecting rod radial clearance on crank pin	.001" -.004"
Connecting rod side clearance on crank pin	.005" -.009"
Crankshaft end play at rear center bearing	.004" -.007"
Main bearing radial clearance on crankshaft	.0015"-.0035"
Camshaft and Valve Mechanism	
Camshaft radial clearance in bushings—	
Front	.0005"-.0025"
Other three	.0005"-.0035"
Camshaft end clearance	.002" -.006"
Valve stem clearance in guide (exhaust)	.0035"-.0055"
Valve stem clearance in guide (intake)	.0015"-.0035"
Valve tappet adjustment	.006" hot-.007" cold
Valve spring tension (when compressed to 1 15/16")	65-71 lbs.
Oil Pump Assembly	
Lash between oil pump driving and idler gear	.004" -.006"
Clearance between oil pump driven gear and shaft	.005"-.0025"
Drive shaft bearing clearance	.0005"-.0025"
Clearance between gears and cover	.0015"-.0055"
Water Pump and Fan Assembly	
Clearance between shaft and bearings	.0015"-.0035"
End play of shaft	.002" -.003"

AXLES

Front Axle

Front wheel toe-in	See page 37
Castor (car unloaded)	1¼°-2¼°
Camber	See page 37
King pin inclination (bottom outward)	9½°
Clearance between king pin and spindle bushings	.0005″-.0025″
Clearance between spindle and bearing cones—	
Inner	.0004″-.0014″
Outer	.0003″-.0013″

Rear Axle

Clearance between splines on axle shaft and splineways in side gears	Max. -.004″

CLUTCH

Clutch pedal free movement	1″-1¼″
Clutch spring pressure at 1 11/16″	105-115 lbs.

ELECTRICAL SYSTEM

Charging rate (cold) (dash reading)	18-20 amps.
Spark plug gap	.025″ -.030″
Breaker point gap	.018″ -.025″
Ignition timing	7° Advance

Bodies

General Exterior and Interior Specifications

All Models are built with a wheelbase of 114" and use the same gear ratio in the rear axle. The following general equipment is common to all models:

One piece fenders.
Cowl lamps.
Windshield wiper
Cowl mouldings chrome plated.
Head lamp posts chrome plated.
Gas tank cover.
Bumper brackets integral with frame.
Steering column adjustable for clearance between wheel and cushion.
Tail and stop light in combination.
Large dust proof head lamps.
Distinctive colors for each model.
Exterior polished parts chrome plated.

Instrument Panel

Instrument panel carries the following instruments neatly grouped and visible to both driver and passenger—

Speedometer.
Fuel gauge.
Oil gauge.
Water temperature gauge.
Ammeter.

Included with the instruments are the ignition lock, carburetor choke, spark control and windshield wiper buttons.

Instrument panel and front compartment are lighted by two lamps, the switch for which is located at the lower edge of the panel.

Closed Model Details

Bodies by Fisher.
Non-glare Fisher V-V type windshield.
Adjustable front seats. Model 30, drivers seat only.
Military sun visor.
Specially designed hardware.
Dome lights.
Foot rests.
Robe rails.
Ash receivers in sedan models.
Automatic windshield wiper.
Rear vision mirror—non-glare.
Upholstery of good quality plush in colors selected to harmonize with exterior colors.
Remote control door handles.
Easy operating window regulators.
Arm rests in rear compartment of sedan models.
Front compartment completely trimmed.
Rubber floor mat in front compartment.

Special Equipment

The following special equipment may be had for any model:

Fender wells.
Trunk rack.
Bumpers.
Demountable wire, disc and wood wheels.

Model 30—Five Passenger Two-Door Sedan

This is a roomy comfortable all purpose car. The doors are wide and the folding front seats allow easy access to the rear compartment.

Model 34—Four Passenger Sport Roadster

This model is specially finished, having full chrome plated head and cowl lamps, natural wood wheels, and a dickey seat in

the deck compartment. A side door is also provided for easy access to the deck compartment.

The top folds into a neat thin package. Bows are natural wood fitted with chrome plated slat irons.

Seats are low and comfortable and there is plenty of leg room for driver and passenger.

Trimming is a good grade of leather. Front and rear compartments are completely finished and fitted with rubber mats.

The windshield is a ventilating and folding type.

Model 35—Five Passenger Phaeton

This is a roomy five passenger, all purpose open car. It has well proportioned front and rear compartments which are completely finished.

Top is fitted with well finished weatherproof side curtains with large lights, and fitted with supports to permit them being opened with the doors.

The windshield is a ventilating and folding type.

Model 36—Two Passenger Business Coupe

This is a well proportioned sturdy two passenger business coupe. The large deck door hinged at the front gives access to the spacious rear compartment. This combined with the large front doors makes this a model particularly adapted for business use.

Model 36-S—Sport Coupe

This is an especially finished four passenger coupe with dickey seat, natural wood wheels and full chrome plated head and cowl lamps. The large doors provide easy access and good driving vision. A small door on the right side gives easy access to the deck compartment.

Model 37—Five Passenger Sedan

This is a four-door sedan which will comfortably accommodate five full size passengers. Doors and seats are especially wide.

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